

NHGRI *fact sheet*

Chromosome Microdissection

What is chromosome microdissection?

Chromosome microdissection is a technique that physically removes a large section of DNA from an entire chromosome. The minimum amount of DNA that can be isolated in this manner is 10 million base pairs, hundreds or thousands of individual genes.

Why do scientists use this technique?

Scientists who study chromosomes, called cytogeneticists, are able to identify each chromosome based on its unique pattern of dark and light bands. Certain abnormalities, however, cause chromosomes to have unusual banding patterns. For example, one chromosome may have a piece of another chromosome inserted within it, creating extra bands. In another case, a portion of a chromosome may be repeated over and over again, resulting in an unusually wide dark band. Because the chromosomes of many tumor cells exhibit irregular bands, some chromosomal aberrations have been linked to cancer and inherited genetic disorders. Therefore, to understand more about what causes these conditions, scientists wish to determine which genes and DNA sequences are located in the regions of the chromosomes that contain these unusual bands. Chromosome microdissection is a relatively new way of isolating these regions by removing the DNA from the band and making that area of DNA available for further study.

How does a scientist perform chromosome microdissection?

To prepare cells for chromosome microdissection, a scientist first treats them with a chemical that forces them into metaphase, a portion of the cell cycle where the chromosomes are tightly coiled and highly visible. Next, the cells are dropped onto a microscope slide so that the nucleus, which holds all of the genetic material together, breaks apart and releases the chromosomes onto the slide. Then, under a microscope, the scientist locates the specific band of interest, and, using a very fine needle, tears that band away from the rest of the chromosome. After using a procedure called PCR (polymerase chain reaction) to copy the DNA in the band repeatedly, the researcher can use those copies to study the region of the chromosome.